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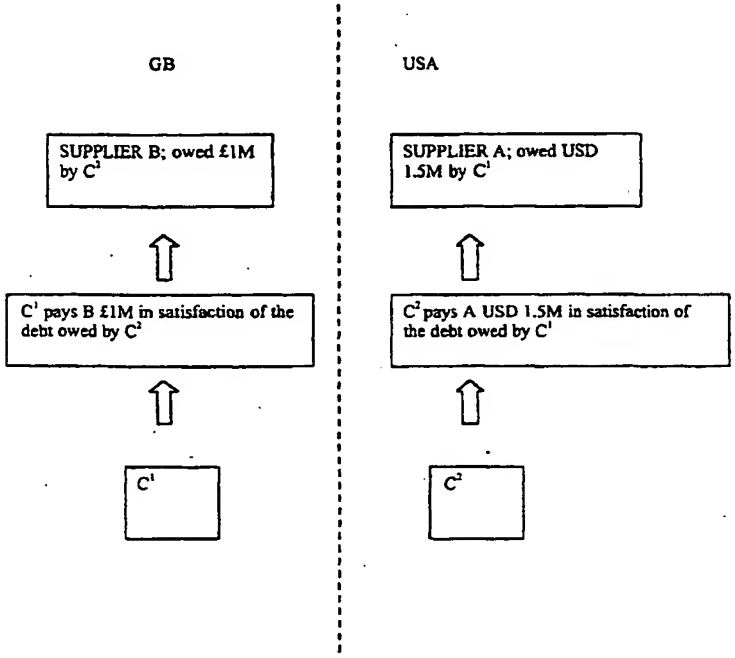

(57) Abstract: Cross border multi-currency payment obligations are met not with conventional complex and expensive FX transactions, but instead with legal persons (typically corporations) in different countries in effect assigning payment obligations so that funds of a party in one country remain in that country and are used to meet the payment obligations in that country of a party outside of that country.

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Method and apparatus for multi-currency funds settlement

Field of the Invention

The present invention relates to a method of and apparatus for multi-currency funds settlement.

Description of the Prior Art

The Internet offers the promise of allowing buyers and sellers of goods and services to communicate directly with one another, eliminating the need for some of the intermediaries and the associated economic inefficiencies present in conventional selling. Hence, for example, it is in 1999 possible to transact many kinds of business using the Internet, which formerly would have required a broker or agent. Examples include the purchase of insurance, airline tickets, books and holidays.

The Internet also enables new models of buying and selling as well: for example, there are now many Internet auction sites, on which a wide range of goods and services are auctioned to the highest bidder, with the seller merely setting a reserve price or a bid start price. The terms to 'buy' and 'sell' and related expressions should be broadly construed to include any kind of transfer of rights or interests; 'buyers' and 'sellers' should be also broadly construed to include any transferee and transferor of any kind of right or interest. The terms 'party' and 'counterparty' are commonly used to describe a situation in which a given party is both a buyer and simultaneously a seller. This can arise, for example, where a party wishes to exchange US$100 for the equivalent in Sterling. That party is simultaneously a seller of US$ and a buyer of Sterling.

Computer systems linking many potential buyers and sellers of goods and services over an extensive computer network also existed prior to the widespread adoption of

the Internet, particularly in the financial services sector. One example is the foreign exchange dealing systems developed and run by organisations such as Reuters plc and the EBS Partnership. In these systems, banks post the prices at which they are willing to buy or sell defined quantities of currencies. The systems may automatically spot matches – i.e. where a buyer is willing to buy at a price at which a seller is willing to sell – and complete the trade. If a potential buyer of currency can find no-one willing to sell at a price it considers low enough, then typically, that potential buyer will simply have to either wait for the pricing in the market to become more favourable, or else be prepared to pay more. Such systems are commonly used for currency speculation, namely taking a trading position with respect to one or more given currencies to exploit favourable pricing movements.

Where a buyer and seller regularly trade with one another, it is normal to aggregate all transactions over a defined period of time and for just a single net payment to be made. Hence, for example, if party A buys 50 units at $1 from party B over a week, and counterparty B buys 20 units at $1 from party A over that same week, then the respective payment obligations can be netted off so that A pays $30 to B at the end of the week. This same principle applies to the more sophisticated environment of trading foreign exchange and other financial property. Where more than a single party and counter-party pair are involved, for example, a 3 way group or even higher orders, multilateral netting can be applied.

Netting systems should minimize the number of intra and inter company receipts and payments, which incur float costs in the banking system. Netting reduces the total payments (cost and credit structure improvement), the number of transactions (cost and system architecture improvement), and often, the risk in a transaction system (credit structure improvement). To illustrate this concept, if UKCorp1 owes UKCorp2 100 Pounds Sterling and UKCorp2 owes UKCorp3 100 Pounds Sterling, then UKCorp1 could pay UKCorp3 100 Pounds directly thereby reducing the payments from 200 Pounds total to 100 Pounds, and the number of transactions from 2 to 1.

In addition to the need for speculative currency trading, there exists also a very substantial need for corporations to buy and sell foreign currency, for example, to pay overseas suppliers. Similarly, individuals travelling abroad or making foreign investments need to obtain foreign currencies as well. Currently, corporations and individuals will approach a bank or foreign currency vendor (such as American Express Inc.) to obtain foreign currency. The bank or foreign currency vendor will in turn often have obtained its stocks of foreign currency from other banks, in many cases having used an inter-bank trading system such as the Reuters or EBS systems. Because of the chain of intermediaries, the transaction cost of buying or selling foreign exchange in this way is quite high: this is reflected in the commission charged and the difference between the bid and the offer prices: a bank will typically sell foreign currency at a rate considerably higher than the rate at which it will buy it back. For small transactions, the difference can be 4%. For larger transactions, the difference is typically 5 basis points.

The mechanics of cross border payments is quite complex. For example, take the situation, where a company C in the US, with US dollars in a US account, wishes to pay a supplier in England in Sterling. Assume also that company C has to pay a supplier in Sterling but has no Sterling receivables to do so. The typical procedure, required for this transaction to be completed using a wire transfer process is as follows:

A. Funds are debited from C's US home bank account immediately on direction to wire transfer and the US dollar funds credited to the US home bank, typically in a general account. A wire transfer is therefore in respect of "final or cleared funds". Depending on the nature of the transfer, a foreign exchange component may be completed between the originator and his financial institution.

B. In most cases, the wire transfer direction to pay is a "push driven" process, in which funds are directed to the international clearing banks (originating and/or receiving) via SWIFT or a network of correspondent financial institutions. In the case of Company C's funds, the US Dollars now resident in a general account of C's home bank are credited to the account of the correspondent or network bank and the chain of correspondent debits and credits begins until the funds are credited to the ultimate beneficiary account The "direct clearer" or correspondent bank in the receiving country is ultimately responsible to push the funds to the receiving bank, who subsequently directs the funds to the beneficiary. The domestic component of the wire transfer typically occurs via the domestic payment system. It is common for each country to have multiple international clearing banks that have correspondent relationships with international clearing banks in other countries and that operate domestically with the payment system. Examples include Barclays Bank, Toronto Dominion Bank, Chase Manhatten Bank, The US Federal Reserve.

C. In the case of a US Dollar to Sterling wire transfer, the UK clearer transfers the funds from the US bank's "GBP nostro" account (either the home bank if it has a nostro account or the correspondent US bank having a nostro account) to the account with the UK correspondent bank and then to the bank of the wire transfer receiver (if they are not the same) through the UK domestic payment system. Hence C has met its obligation in the UK. A US FI's GBP nostro is a bank account held at a GB FI in the name of the US FI but holding the currency of the foreign jurisdiction, in this case GBP.

This process is relatively expensive and involves numerous participants: Two international clearers, one per country, typically two correspondent banks having nostro accounts with each other, two home banks one each for receiver and originator, and two transactors, an originator and a receiver. Further to that, a push driven system is open to processing delays as financial institutions seek to maximize the use

of available funds as part of their overnight float and hence only move the funds when absolutely necessary.

Summary of the Invention

In accordance with a first aspect of the invention, the method of multi-currency funds settlement comprises the following steps:

funds in a currency X of a first legal person who is situated in country X^1 are transferred in whole or part within country X^1 to satisfy in whole or part the currency X^1 payment obligations of a second legal person, situated in a different country Y^1;

and the funds in a currency Y of that second legal person situated in country Y^1 are transferred in whole or part within country Y^1 to satisfy in whole or part the currency Y payment obligations of a legal person, who may be the first legal person or one or more different or additional legal persons.

Hence, the essential principle is for cross border multi-currency payment obligations to be met not with conventional complex and expensive FX transactions, but instead with legal persons (typically corporations) in different countries in effect assigning, novating, swapping or otherwise altering payment obligations so that funds of a party in one country remain in that country and are used to meet the payment obligations in that country of a party outside of that country. The term 'assigning' will be used in this specification to cover any such kind of alteration of payment obligations and is not limited to a legal or equitable assignment as such.

Clearly, full settlement of payment obligations is unlikely to occur where the total system involves only 2 parties and 2 countries, although this too is possible if both parties have corresponding bank accounts in both of the relevant jurisdictions (4 accounts total). The practical realisation of the present invention therefore likely occurs in multi-party, multi country situations, where, given sufficient fund volumes

and diversity, all or virtually all payment obligations can be fully satisfied. With sufficient fund diversity and volumes, most if not all multi-currency cross border settlements can be satisfied using solely domestic transactions: only the residual elements left over after all domestic transactions have been netted off require genuine cross-border settlement. This inherently operates as a risk reduction mechanism as the bank never takes a principal position, but rather acts solely as a custodian. It further reduces the amount that can ever be in dispute by only ever using precleared funds of the various participants. Therefore in the event of a problem which requires transaction unwinding, the most at risk for any party is the gain or loss associated with the interim movement in exchange rates between the relevant currencies.

In a second aspect, there is a computer program receiving data defining the non-domestic payment obligations of parties located in two or more countries, and programmed to identify opportunities to satisfy those non-domestic payment obligations by assigning payment obligations using the funds settlement method defined above.

A third aspect of the invention is a computer server programmed with the computer program of the second aspect.

A fourth aspect is a computer terminal acting as a client, in which the client accepts from a party a foreign exchange requirement and sends that requirement to a server as defined in the third aspect.

A fifth aspect is a computer based system which enables parties located in two or more jurisdictions to meet their foreign currency payment obligations, comprising a first computer terminal into which a party located in a first jurisdiction inputs details of a potential first foreign currency financial transaction, a second computer terminal into which a second party located in a second jurisdiction inputs details of a potential second financial transaction, a computer network connecting the first and second

terminals; characterised in there being a computer program arranged to determine if any transfer of funds from the first party to a payee located in the first jurisdiction satisfies in whole or part the requirement of the second party to transfer funds to that payee. Instead of a merely bi-lateral system, in a practical implementation there may be numerous computer terminals in numerous countries and the computer program is then arranged to determine if any transfer of funds from a party to a payee located in the jurisdiction of that party satisfies in whole or part the requirement of another party to transfer funds to that payee.

The present invention utilises and exploits a special aspect of currency dealing, namely that the currency of any country does not, typically, ever leave that country. That is to say, for example, a US dollar account in Canada is merely a Canadian dollar account with a conversion factor to a US dollar equivalent.

The present invention utilises a computer-based system to restructure the method of payment and settlement to reduce the number of participants, thereby streamlining the procedure and improving efficiency.

Brief Description of the Drawings

The invention will be described in more detail with reference to:

Figure 1 which is a diagram representing the bid/offer pricing for USD priced in CAD;

Figures 2A, 2B and 2C which is a table showing how a FX netting 'hybrid' system can operate;

Figures 3A and 3B, which are schematic depictions of a computer based system which enables buyers and sellers of foreign exchange to be efficiently matched; and

Figure 4, which is a schematic representing the key steps in the system as applied to FX matching; and

Figure 5, which illustrates the mechanics and benefits of transactions netting

Figure 6 which is simplified schematic showing the principle of the payment approach of the present invention

Figure 7 which is a table relating to an example of a series of payments made using the present invention and

Figure 8 which is a schematic of the computer system for implementing international payments as defined in the present invention.

Detailed Description

The present invention will be described with reference to various examples, as illustrated in the attached Figures.

Currently, banks broker foreign exchange transactions, providing an intermediary to purchase and sell currency for both theirs' and their clients' accounts. For each transaction the bank garners the "spread", typically 5 basis points on large transactions and up to 4% on smaller transactions.

In the present invention, the appropriate underlying transactional software allows one end user of the foreign exchange (e.g. a first corporation, Corporation A, doing a cross border procurement) to liaise directly or indirectly with a counterparty, a second corporation, Corporation B, which requires the home currency of Corporation A. The bank brokering function, as it pertains to the financial instrument itself, can be reshaped; that is, the spread currently absorbed by the two sample corporations could be reduced or negated. Each party might therefore improve its cash position by one half the value of the spread that they would incur, for example on a 5 basis points

spread, the corporation would improve its position by 2.5 basis points. For smaller customers the savings on a percentage basis would be substantially greater.

Moreover, transactions could be executed in a multitude of dimensions: two way; three way; four way; etc, since the software would expose the transactional opportunities available to each of the clients. (This process is described in more detail in Appendices 1 & 3)

The overall system approach can best be understood through a sample problem:

Sample problem

Imagine the following:

1. That the spot price of CDNS is USS 1.5363 - 1.5373 at November 27/98.
2. That Corporation A is buying US $1M to purchase equipment at a cost of CDN $1,537,300.00. Corporation A. has CDN S1,536,800.00 on account with a bank for the transaction (note: this assumes that the bank provides the best rate to Corporation A).
3. That Corporation B has USS1M on account with the bank but requires CDNS1,536,300.00 to purchase raw materials.

If the bank matches its own funds to supply Corporation A with USS1M and Corporation B with CDNS1,536,300.00, then it makes a profit of S1,000.00 per Smillion transacted. Although S1,000 is a very small amount in the context of a significant S1M transaction, the total global volume of such transactions is extremely large, so that the cumulative profits to banks are very substantial.

In the present invention, the following occurs: Corporation A and B agree before transacting that they will do so at an exchange rate that is the mid-point of the posted Interbank rate, for example, the Interbank highest bid, lowest offer at the appropriate time. This is a fair compromise for each participant. Hence, the transaction can be

completed automatically, rapidly and efficiently. The party and counterparty each deposit the funds needed to execute a transaction with a financial institution; the funds are preferably pre-cleared and are not marginable through the system. A sophisticated computer program determines that the party and counter-party are taking reciprocal positions, which can be matched against each other and instructs the relevant financial institutions to transfer the required foreign exchange as, in effect, a swap. By matching Corporation A with Corporation B, each of their positions is improved by $500.00 per million, less a transaction fee to an intermediary of perhaps $50.00 per side. The result is that Corporation A receives US$1M for $1,536,750 per million; a saving of $450.00 per million; Corporation B Receives $1,536,850 for US$1M; an improvement in profit of $450.00. The system has in effect reduced the spread to 1 basis point. The spread can theoretically be reduced to just short of zero since the present invention operates efficiently and automatically. This example works because of the exactly matching reciprocal requirements of the parties. In practice, that will rarely happen and some sort of netting will be required.

The fundamental netting concept applied in this embodiment is that a computer is programmed with information relating to a party and counterparty transaction, to determine a net payment position if both the first and second transactions were to occur and to actually complete each transaction on the basis of the net payment position.

This approach can be contrasted with conventional netting, in which a transaction is completed and only subsequently does netting occur to reduce the number and size of payments. Typically, there might be several party/counterparty pairs in a connected series of transactions in the present embodiment.

Multilateral Netting Example

In the present system, it will be seen that the netting step is not simply a stage subsequent to but independent from the underlying exchange transaction, performed

for accounting simplicity to reduce the numbers and sizes of cross-payments. Instead, it is an integral part of the underlying exchange transaction between party and counterparty. This is most clearly emphasised when considering a multi-party exchange of currencies. Take, for example, a situation in which there are 3 Corporations - A, B and C . A has CAD and needs JPY; B has JPY and needs USD; C has USD and needs CAD. The exact needs are shown in Figure 2A. A cannot satisfy its requirements in whole or in part by dealing with B exclusively. However, if C can be "linked" into the transaction, all three corporations can be satisfied to the value of the smallest available currency. (A more detailed example with multiple parties and jurisdictions is available for review in Appendices 1, 2, and 3).

We assume that the mid-point of Interbank B/O at a point in time is as follows: 1.53675 CAD; 1 USD; 88.7755 YEN; (i.e. all numbers are relative to the USD base currency).

The desired amounts indicated on Figure 2A reflect the mid-market value of the available currency. The post-match situation using this embodiment is shown on Figure 2B.

It will be noted that the limiting factor in this match example was the availability of CAD for JPY.

The embodiment uses a "currency link" to match partially or fully the desired quantities of the match. A currency link is created using the source currency and the beneficiary (desired) currency for a series of transactions. Figure 2C illustrates a simple three-way currency link.

Note, that if, for example, Party C wanted a currency other than AAA, say DDD, there would not be a currency link from which to synthesize a transaction.

A link is therefore defined as (A to B; B to A); or (A to B; B to C; C to A); or (A to B; B to C; C to D; D to A) etc. A mathematical relationship at a point in time therefore exists between the currencies. Another example is A to C, B to A and C to B.

The distinction from traditional netting programs is three-fold. First, netting in the present embodiment happens in "real-time", not at a fixed point in time post transaction for various parties, none of which are necessarily the same from one "link" to the next, and consequently, from one "match" (whole or partial) to the next. Second, the program is designed to seek out the "currency linking" through a combination of user defined parameters and system transaction rules. As complete matches occur (as in A above), the matched party drops out of the matrix or queue. The program seeks out the next currency links based on a set of transactions rules to fulfill wholly or partially the next match. Third, traditional netting occurs on completion of a series of transactions. For example, if Party A is obligated to pay Party B three units of a currency and Party B is obligated to pay Party C three units of a currency, a netting transaction would have Party A pay Party C three units of currency directly. In this embodiment, transactions are synthesized by matching source (available) currency to beneficiary (desired) currency requirements. As such the transaction could be deemed a netting 'hybrid'.

The present system may be further understood with reference to Figures 3A and 3B, which each show a schematic of the major elements in a foreign exchange matching system in accordance with the present invention. Figure 3A is an actual proposed architecture schematic for an FX embodiment prepared by Primix Solutions Inc; the embodiment is called 'BuyFX'. The functions of the major blocks in Figure 3A and 3B are the same and are as follows: the party and counterparty each interact with the foreign exchange matching system using their web browsers (1, 2), which communicate via the Internet 3 with a conventional Web cluster/firewall 4 connected to an application server cluster 5 running Netscape Application Server, IBM WebSphere or BEA WebLogic. Cluster 5 is connected to a message bus 7, such as

ActiveWorks or Tibco. The message bus 7 is connected to a live data feed 6, which provides continuous and up to date pricing information. A Reuters or Bloomberg feed could be used. Message bus 7 is also connected to a mail server 8 which communicates with various entities, including the party and counterparty.

Message bus 7 is also connected to the matching system server 9, which runs a Java or C++ program calculating not only the mid-point prices (and related spreads, if applicable) using data from the live feed 6 but also identifying where netting opportunities exist to enable a currency match to occur and the nature of the netting. Matching System server 9 is connected to an Oracle database 10. Message bus 7 is connected to the various system financial partners 11 (typically one, but not limited to one, in each jurisdiction whose currency is available for matching through the system). These are typically banks or deposit taking institutions. These partners actually take the payment from and make payments 12 to each party and counterparty in the amounts defined by the matching system server 9.

Reference should now be made to Figure 4, which is a step by step walk through the process. Figure 4 includes, but is not limited to, the denoted steps to execute a transaction. At step 1, a party with a need for foreign exchange logs onto a secure web site using its browser. Initially, the party has to complete a customer profile and user authentication. This involves the following steps: On entering the secure FX Matching System web portal, the customer has to:

(A) Register with the FX Matching System and its jurisdictional banking partners in a secure environment (if a new user), or

(B) Authenticate its identity with a user name and password (if an existing user).

(C) If a new user, it also has to enter various administrator-defined restrictions- user restrictions, currency restrictions, volume restrictions e.g. User "XXXX" can transact in currency "XXX" and "YYY" only, in volumes not to exceed "XXXXXX".

Once authenticated as a user, the customer will be able to complete a secure submission document using its Web browser (Step 1). This document enables a user to:

(A) List, in a secure environment, commonly used source accounts and beneficiary accounts.

(B) Enter an electronic funds transfer request, with funds moving from a source account to a beneficiary account at a jurisdictional banking partner, if necessary.

Once its funds have been deposited and the cleared funds are "held" by a jurisdictional banking partner, the customer is able to 'post' funds using the browser based submission document as follows:

(A) By requesting a conversion on a defined source amount (e.g. the customer has a source quantity of $1M USD which it requires to be converted to CAD), or

(B) By requesting a beneficiary amount, the computer program will calculate the quantity of source funds required, utilizing a "buffer percentage" to account for potential currency fluctuations. The "buffer percentage" is a convenience feature for customers and will be calculated on a currency specific basis at two standard deviations of the daily fluctuation of the currency.

The secure submission document also allows each user to define the kind of transaction required. Examples of user-defined functionality include, but are not limited to, the following :

(A) 'Match' – the exchange transaction is completed as and when reciprocal funds become available in whole or in a series of partials for a customer to fulfil a currency order; this process can be time-sensitive. Implicit in the Match order is end of day execution of any unfilled balances, unless the customer has his own beneficiary account and elects to bypass that option;

(B) 'Match (All or none)' – the exchange transaction is completed only as and when a complete block of currency (as a series of partials or in one reciprocating block) becomes available to fulfill a currency order: (again, this can be time-sensitive);

(C) 'Match and Market (M & M's)' – a time sensitive order to fill the customer currency requirement with as much "matched" currency as is available during a user-defined period of time, with the option of executing the balance at the prevailing market rate with a banking partner or financial institution;

(D) 'Market' – an order allowing a customer to bypass the matching process and go directly to a jurisdictional partner for execution; this can be time-sensitive;

(E) 'Special Liquidity' – certain corporate partners, and, in some circumstances, regular customers will be able to submit orders at preferred rates to augment liquidity. "D-SL" orders never have precedence over regular "Direct" orders.

The Submssions Document is then securely transmitted (step 2) to the Matching System Server (B). The Matching System Server (B) then requests (step 3) the appropriate financial institution (C) to verify the information given by the party (including the availability of funds) and to authenticate the user from the financial institution's perspective. An account held with this multi jurisdictional financial partner(s) serves nothing but a transactional purpose through which funds are matched and distributed. The multi jurisdictional financial partner(s) accepts funds on account in the currency by which they were deposited. Correspondingly, this institution delivers funds to the customer in the beneficiary currency at the prescribed rate of exchange. All currency exchange is electronic so that no physical securities are required for clearing.

Once the financial institution (C) has confirmed that the user has the required funds to be exchanged it in effect freezes those funds, and then authorises the matching system (step 4) to post the required information and proceed with the transaction. The Matching System (D) then performs the netting identification process illustrated at Figure 2B, using the mid-point prices it calculates using the data from live feed (A).

Matching System (D) uses the following order prioritisation feature. In order to prevent one company and/or transaction from "locking out" other customers by placing a substantial order in relation to the available liquidity, customers will be able to place orders to a maximum size of "X" USD equivalent. The software will accept volumes in excess of this size. These will be automatically processed into a series of smaller transactions, determined by the Matching System (D) and contingent on the liquidity of the currency. Execution of these smaller transaction volumes will occur in sequence with the initial block being completed on a "first in, first out", followed by the next Matching System (D) customers in that currency, if any, on a FIFO basis; followed by the second block from the transaction; followed by the next customers in that currency, if any, and so on until the cumulative volume is filled. This prevents one customer from monopolizing any one currency to the detriment of other customers.

Where a successful match has occurred, the Matching System (D) notifies the various financial institutions to complete the funds transfer. More exactly, transactions are aggregated by Matching System (D), reconciled, and recorded to one central file per jurisdictional financial institution. The "batched" files are transmitted to the jurisdictional partner (step 5).

Notification arises through the Matching System (D) issuing an 'International Payment Instruction'. This is an order to a financial partner to record payment instructions to a customer defined beneficiary account;

Issuance of the 'International Payment Instruction' will occur under, but will not be limited to, the following conditions:

(A) When a customer is "matched" fully

(B) When a customer is filled at the end of the day

(C) When a "Match and Market" order has been fulfilled.

(D) If customer selects "Market" or "Match (All or none)" order.

(E) If a customer elects to carry an order over a number of days, until that order is filled in its entirety, the direction to pay option to a Payee Account remains unavailable. In that circumstance, the customer must maintain his own beneficiary account.

In addition to handling International Payment Instructions, the system can equally well handle Domestic Payment Instructions – for corporations who seek to transfer funds domestically.

In addition to issuing the International Payments Instruction, the Matching System (D) records the transaction details and time-stamps them. Pricing is also screened by the Matching System (D) for anomalous trades to ensure transaction integrity. Matching System (D)also causes an e-mail customer notification of a match to be issued, pending final payment and settlement.

Payment instructions are then confirmed, aggregated, and reconciled at the financial partner. Payment is subsequently effected (step 6) to the denoted beneficiary accounts (payee or customer). Each jurisdictional banking partner will release funds at the earliest available opportunity after the daily batching function. Confirmation details are recorded for transmission to customers: confirmation email and online transaction reporting details are transmitted to each customer (step 7). Call centre functionality allows customer to gain transaction details should their ISP be experiencing technical details. At step 8, each customer can obtain a transaction confirmation certificate (Step 9). The transaction is now fully completed.

There are various additional aspects to the FX Matching System, which are not illustrated. For example, a product for individuals (business travelers) is available; as is a corporate wholesale product for intermediary exchange requirements; and a "market" product for blue-chip multinationals. The transaction size in these incarnations may dictate the transactions "fee" for executing a currency match; the

program could, but does not have to automatically categorize the trade into the appropriate product with the appropriate rate scale.

Another use of the system is as an intra/inter corporate netting and money management facility (see The Mechanics of Netting Figure 5), in which currency requirements can be met as the intra corporate currency becomes available in other jurisdictions.

A hedging facility for foreign exchange exposure may also be included, in which matched forwards can be offered by the jurisdictional financial partner.

In addition, exposure positions are available to the multi jurisdictional financial partner(s) to mitigate systematic risk with one another.

The system can be implemented as a series of scalable products available for distribution through many different channels through the Internet; the customer may enter the system directly through the denoted web site to transact; the customer may enter via the web site of our multi jurisdictional partner(s) in a co-branded product, or the customer may enter via the web site of a multi jurisdictional partner in a "partner-branded aka white-branded" or non-branded interface. For the retail individual, an affiliation between the present system and a courier and travellers cheques company is possible. This enables a transaction to be completed anywhere in world with the traveller's cheque couriered directly to the individual. This is envisaged as a premium service delivered via the Internet.

As explained above, the system can provide cross-border settlement of accounts, converted to the currency of choice, at exchange rates that represent the closest to fully efficient currency markets. This is particularly advantageous for the small/medium corporate user.

Clearing transactions

In a preferred embodiment, there is a central clearer (or a group of clearers, presumably financial institutions), with access to the jurisdictions in which currency is both sourced and required. This could be a single financial institution or trustee, or a group of financial institutions or trustees which can secure the transactions. An account held with the clearing body serves nothing but a transactional purpose through which funds are matched and distributed. The central clearer or its affiliates should have the ability to accept funds on account or with a financial institution in the currency by which they were deposited. Correspondingly, this institution delivers funds to the customer in the beneficiary currency at the prescribed rate of exchange. All currency exchange is electronic and no physical securities are required for clearing.

Payment & Settlement

The simplest scheme involves 2 parties in 2 countries with equal and off-setting obligations. In the United Kingdom, imagine that a party C^1 has £1million GBP (Great Britain Pounds) in available funds in a bank account in the United Kingdom and needs to pay $1.5million (US dollars) to its supplier A in the US. In the US, party C^2 has $1.5million in available funds in a bank account and needs to pay £1million to its supplier B in the UK. Assume for simplicity that the exchange rate is $1.5 per GBP. Conventionally, C^1 might wire transfer $1.5million (US dollars) to supplier A in the US: that process involve the complex steps involving numerous parties explained in the Description of the Prior Art section of this specification.

Likewise, C^2 might wire transfer £1million to supplier B in the UK, with equivalent steps. This prior art process is however relatively expensive and slow. In the system of the present invention, shown in Figure 1, however, a central computer system is fed the payment obligations of each party, and rapidly spots that a simple swap of obligations is possible. It then causes party C^1's £1million to be paid to supplier B in settlement of C^2's payment obligation to supplier B and also causes C^2's $1.5million to be paid to supplier A in settlement of C^1's payment obligation to supplier A.

As noted above, this rudimentary 2 party example is offered as an introductory example of the underlying concept. In practice, there will likely be many parties and many countries.

As a somewhat more complex example, a 3 party example would operate as follows. In this example, a new intermediary, BuyFX.com, is introduced. BuyFX.com operates the central computer system underlying the present invention.

Assume the following simple scenario, depicted in the table at Figure 1.0 below:

- Corporations: C^1, C^2, C^3
- Corporation's Domestic Financial Institution: FI^{C1}, FI^{C2}, FI^{C3}
- Corporation's Foreign Financial Institution: FI^{FC1}, FI^{FC2}, FI^{FC3}
- BuyFX.com's Correspondent Banking Partners: FI^{BFX1}, FI^{BFX2}, FI^{BFX3}
- C^1 - Owns GBP; Requires USD;
- C^2 - Owns USD; Requires YEN;
- C^3 – Owns YEN; Requires GBP

In this example, C^1 cannot satisfy its requirements in whole or in part by dealing with C^2 exclusively. However, if C^3 can be "linked" into the transaction, all three corporations can be satisfied to the value of the smallest available currency.

Therefore, in simple terms, if C^1's USD requirement could be satisfied via C^2, C^2's YEN requirement via C^3, C^3's GBP requirement via C^1, you could reduce the number of participants in any leg of a transaction. That is, the various "cross border" elements of a transaction become nothing more than a series of netted domestic transactions.

Where previously there could be 18 or more participants over 3 transactions, there is now a maximum of 15, with a minimum of 9 (assuming distinct financial institutions in each jurisdiction).

The relationship and methodology to achieve this end is depicted in Figure 1.

The fundamental requirements for this system are:

- A central computer system, networking participating financial institutions, which calculates transfer amounts and electronically instructs financial institutions in the area of funds direction. (FEDI)

A network of financial institutions (one or more), which has available to it the mathematical and communications software to relay customer instructions regarding the transfer of funds to a payee.

A central computer system, which uses batch file processing to execute recorded transactions and direct payments accordingly.

Referring to Figure 3, each party using the BuyFX.com system (i.e. C^1, C^2, and $C^{2'}$) instructs its own domestic financial institution that it requires a foreign exchange payment to be made. That can be done in several ways; for example, each party could access a BuyFX.com web site and enter the details of the amount and the payee; it would previously have entered into a mandate with BuyFX.com so that any instructions given by it in an authorised manner to the BuyFX.com web site triggers an automated debiting of cleared funds from that party's bank account into the BuyFX.com correspondent bank. Hence, when C^1, which banks in GBP, instructs its bank FI^{C1} that it wishes a USD payment to be made to its US supplier, then, the equivalent amount in GBP is debited from the cleared funds in the account of C^1 held at FI^{C1} and transferred to FI^{BFX1}. Generally, that will only occur after the Central System of BuyFX.com has determined that a match can be established which will led to a full or partial satisfaction of several parties payment obligations. That requires the

Central System to monitor all foreign exchange requests, and, when it spots a match, to inform the BuyFX.com correspondent banks, FI^{BFX1}, FI^{BFX2} etc, over the FEDI network. The BuyFX.com correspondent bank in a given jurisdiction then pulls payment from the payer's domestic financial institution and forwards it to the foreign financial institution acting for the party who wishes to make a payment to a payee in that same jurisdiction (e.g. in the case of GB in Figure 1, the payee in GB is C^3's supplier, where C^3 is based in Japan. Hence, the BuyFX.com correspondent bank in GB sends the GBP it has obtained from C^1's bank money to C3's GB foreign financial institution, FI^{FC3}, who then passes it to the GB payee in satisfaction of C^3's debt to that payee.

Further detailed aspects of an implementation are contained in the following appendices, in which:

1. Appendix 1, which details the searching methodology and algorithm; and
2. Appendix 2, which details the transaction aging procedure and the order of operations; and
3. Appendix 3; which details the matching algorithm and netting (hybrid) procedure

Appendix 1 – The Searching Methodology and Algorithm

1. Each currency is assigned a unique base ten exponential value henceforth known as an Assignment Value (AV) see Table 1.0 below. Example: GBP-AV 1.E+02

2. Source Currency Assignment Value (SCAV) e.g. SCAV for USD = 1.E+00 Beneficiary Currency Assignment Value (BCAV) e.g. BCAV for CAD = 1.E+01, see Glossary of Terms.

Table 1.0: Assignment Values

#	Currency	Values	Exponential
1	USD-AV	1	1.E+00
2	CAD-AV	10	1.E+01
3	GBP-AV	100	1.E+02
4	JPY-AV	1000	1.E+03
5	EUR-AV	10000	1.E+04
6	AUD-AV	100000	1.E+05
7	CHF-AV	1000000	1.E+06
8	ZAR-AV	1000000 0	1.E+07

3. To distinguish between currency combinations, one aggregates the assignment values of the underlying currencies. Example CAD/GBP/EUR = 10110. No other currency grouping can generate this assignment value. Each grouping has its own unique assignment value.

4. Key to the process is that no combination of assignment values can be aggregated to equal the assignment value of any other currency. A base ten searching mechanism provides this characteristic.

5. Using AVs from Table 1.0, one can generate matches mathematically. See Example 1.0.

6. The searching mechanism has a finite number of combinations that can be easily defined by Formula 1.0.

7. Formula 1.0: Total Combination Calculation

$$T(n,x) = C(n,x) + C(n,x-1) + C(n,x-2) + \ldots + C(n,2)$$

where C represents the number of combinations given n, the size of the universe and x, the number of elements in any one combination; x can be less than or equal to n and greater than or equal to 2.

8. Examples: Eight and Nine Currency Environments

Therefore, in an eight currency environment, the total number of combinations equals:

$$T(8,8) = C(8,8) + C(8,7) + C(8,6) + C(8,5) + C(8,4) + C(8,3) + C(8,2)$$

$$T(8,8) = 1 + 8 + 28 + 56 + 90 + 56 + 28$$

$T(8,8) = 267$ maximum combinations assuming we accept all possible links.

In a nine currency environment, the total number of combinations equals:

$$T(9,9) = C(9,9) + C(9,8) + C(9,7) + C(9,6) + C(9,5) + C(9,4) + C(9,3) + C(9,2)$$

$$T(9,9) = 1 + 9 + 36 + 84 + 126 + 126 + 84 + 36$$

$T(9,9) = 502$ maximum combinations assuming we accept all possible links

9. Note that the above equation is terminated at C(n,2) as two items at least are necessary to generate a match.

10. Note that the above equation can readily generate the number of available combinations should BuyFX.com wish to limit the matching procedure to any maximum

number of participants. For example, BuyFX.com could have a 20 currency environment with a maximum of 6 participants to a transaction: mathematically the number of possible combinations to reflect these parameters can be described as:

$T(n,x) = C(n,x) + C(n,x-1) + \ldots + C(n,2)$ where n is the number of available currencies and x is the maximum number of participants in any one transaction.

For a 20 currency environment, with a maximum of 6 participants to any one transaction:

$T(20:6) = C(20,6) + C(20,5) + C(20,4) + C(20,3) + C(20,2)$

$T(20:6) = 38,760 + 15,504 + 4,845 + 1,140 + 190$

T (20:6)60439 possible combinations

11. Source Currency Assignment Value (SCAV) is compared to the Beneficiary Currency Assignment Value (BCAV) to generate the match(es).Where the SCAV = BCAV for the same subset of clients, a match exists.

12. Example 1.0

Numerical Example: Searching Methodology

Assumptions

a. Randomly entered data points denoting source and beneficiary currency req'ts.

b. All transactions entered at time t=1.0; hence no transaction in the example has precedence based on time.

c. Source Currency USD
Beneficiary Currencies CAD CHF

d. Source Currency CAD

Beneficiary Currencies JPY AUD

e. Source Currency GBP
Beneficiary Currencies USD EUR

f. Source Currency JPY
Beneficiary Currencies GBP ZAR

g. Source Currency EUR
Beneficiary Currencies USD

h. Source Currency AUD
Beneficiary Currencies EUR

i. Source Currency CHF
Beneficiary Currencies USD GBP ZAR

j. Source Currency ZAR
Beneficiary Currencies EUR

13. The above observations could be illustrated numerically as in Table 1.1

Table 1.1 Assumptions Denoted in Table Form with Corresponding Assignment Values

		USD	CAD	GBP	JPY	EUR	AUD	CHF	ZAR
	SCAV	1.E+00	1.E+01	1.E+02	1.E+03	1.E+04	1.E+05	1.E+06	1.E+07
	BCAV								
USD	1.E+00			1.E+00		1.E+00		1.E+00	
CAD	1.E+01	1.E+01							
GBP	1.E+02				1.E+02			1.E+02	
JPY	1.E+03		1.E+03						
EUR	1.E+04			1.E+04			1.E+04		1.E+04
AUD	1.E+05		1.E+05						
CHF	1.E+06	1.E+06							
ZAR	1.E+07				1.E+07			1.E+07	

14. AV Matches

Assumptions: In this example, all transactions aged identically at t=1

Assumptions: In this example, all transactions aged identically at t=1									
Match	1	1.E+01	1.E+05			1.E+00	1.E+04		
SCAV		110011	USD,CAD,EUR,AUD				BCAV		110011
Match	2	1.E+06						1.E+00	
SCAV		1000001	USD,CHF				BCAV		1000001
Match	3	1.E+01	1.E+03	1.E+00	1.E+02				
SCAV		1111	USD,CAD,GBP, JPY				BCAV		1111
Match	4	1.E+06				1.E+00		1.E+07	1.E+04
SCAV		11010001	USD.EUR.CHF.ZAR				BCAV		1101000 1

15. By comparing the aggregated assignment values of the source currencies against the beneficiary currencies, one can discover the matches. Where the values are identical, there is a match.

16. Mathematically, this is illustrated as follows: SCAV - BCAV = 0 (Formula 1.1)

Matches: Denoted by source and beneficiary assignment values being equal.

a. Source Value 110011
Beneficiary Value 110011
Match: USD CAD EUR AUD

b. Source Value 1000001
Beneficiary Value 1000001
Match: USD CHF

c. Source Value 1111
Beneficiary Value 1111
Match: USD CAD GBP JPY

d. Source Value 11010001
Beneficiary Value 11010001
Match: USD EUR CHF ZAR

17. Since the subset of required assignment values is finite: the searching procedure is easily executable.

18. The system is easily scalable with the addition of currencies see #4 above. The maximum number of combinations is finite and can be defined. As this relates to CPU capacity, the requirements can be estimated with confidence.

Appendix 2 – Transaction Aging Procedure and Order of Operations

1. While the Searching Algorithm provides a very clear methodology to exposing matches mathematically. Consideration must also be given to:

    i. the Transaction Aging Process
    ii. the Order of Operations

2. The Transaction Aging Process is a time-based order management procedure through which entries are prioritized on a first in, first out basis, subject only to the parameters and limitations of either the BuyFX.com Transactions Rules or User Defined Parameters.

3. Order of Operations is a combination of Transaction Rules and User Defined Parameters, which necessitate unique treatment of the data entry in question. For example, if a customer tags the "All or none" order, the system must provide for this restriction by ensuring that the complete execution of the order can occur prior to engaging this entry in any transaction.

4. The Transaction Aging Process

    i. Given that the user entry requires no special treatment in relation to the BuyFX.com Transactions Rules, and that the entry is not tagged with a user defined limitation, precedence of one entry over another is exclusively time based. In other words, the first entry into the system will, ceteris parabis, have priority over any subsequent entry.

5. Example 1.0

Table 1.0: Assignment Values

#	Currency	Values	Exponential
1	USD-AV	1	1.E+00
2	CAD-AV	10	1.E+01
3	GBP-AV	100	1.E+02
4	JPY-AV	1000	1.E+03

Randomly entered data points denoting the following transactions conditions:

At t=1.0; USD-SC; CAD-BC, therefore SCAV = 1, BCAV = 10

At t=1.1; EUR-SC; USD-BC, therefore SCAV = 100, BCAV = 1

At t=1.2; CAD-SC; EUR-BC, therefore SCAV = 10, BCAV = 100

At t=1.3; USD-SC; EUR-BC, therefore SCAV = 1, BCAV = 100

where SC is Source Currency & BC is Beneficiary Currency

6. Transaction Aging Procedure

	SC	USD	CAD	EUR	JPY
	SCAV	1	10	100	1000
BC	BCAV				
				T=1.1;	
USD	1			AV=1	
CAD	10	T=1.0; AV=10			
		T=1.3;	T=1.2;AV=10		
EUR	100	AV=100	0		
JPY	1000				

7. AV Matches by Age

I.	At T=1.0	No match	
II.	At T=1.1	No match	
III.	At T=1.2	Match	SCAV=BCAV=111
IV.	At T=1.3	Match	SCAV=BCAV=101

Notes:

I. Match at T=1.3; if USD and EUR remaining in the queue after Match at T=1.2.

II. If USD or EUR supply exhausted at T=1.2, Match at T=1.3 will not occur.

III. If observation at T=1.3 occurs prior to T=1.2; Match AV=101 will have priority over Match AV=111. In this

example Match AV=111 will not occur as one, of either, USD or EUR would be exhausted.

8. The Factors Influencing the Order of Operations

Time Stamp - per Aging Rules above

Size - parceling if necessary to ensure customer fulfillment and prevent "monopolization" by any one customer.

Type of Transaction - Match; Match and Market, Match (All or None), Market, Special Liquidity

User Defined Parameters - price limits, duration, etc.

Appendix 3 – The Matching Algorithm

1. By combining the BuyFX.com Searching Algorithm with the Transactions Aging Procedure, AV Matches can be discovered. (see BuyFX Searching Algorithm and BuyFX Transaction Aging Methodology & Order of Operations)

2. When an AV Match is discovered via the BuyFX Searching Algorithm, at least two clients will be party to the transaction. The limiting factor to the transaction will, therefore, be the least supply of currency (or the smallest Source Currency Quantity or SCQq) among the parties to the transaction. eg. Assume AV Match = 101 (GBP and USD); one client has 100,000 USD for GBP and another has 100,000 GBP for USD; USD/GBP = .62225: the limiting factor to this transaction is the SCQq of 100.000 USD. Therefore, the client with SC=USD and BC=GBP will receive all of his desired GBP and drop from the queue. All other parties will remain in the queue subject to user parameters and transaction rules.

3. To calculate the amount of currency allocated to each of the parties in a transaction:

A. Each supply of currency is denoted in a common or base currency equivalent form. Since USD is the global standard against which all currencies are typically quoted, USD will be used as the base currency for these calculations. Formula 1.0 describes a currency in terms of the base currency, in this case, USD.

Formula 1.0:

Q^{USD}(SC in Base terms)=SCQ/SC FX Rate as against the Base Currency

or $Q^{USD} = SCQ/R^{USD/SC}$

Example: To calculate JPY in USD terms, R=109.45, SCQ=109,450 JPY

$$Q^{USD} = SCQ^{JPY}/R^{USD/JPY}$$

$$Q^{USD} = 109,450/109.45 = 1000 \text{ USD}$$

Therefore, at time t, 109,450 JPY was equal to 1000 USD.

B. The SCQq is determined, thereby defining the limiting source and quantity of currency against which the other participant volumes can be calculated. Each party to the transaction will undergo the calculation denoted in Formula 1.1 to determine the supply of currency which that particular client will contribute to the transaction (SCQ^T)

Formula 1.1:

SCQ^T (quantity supplied to the transaction) = SCQq x Source FX Rate as against the Base Currency

or $SCQ^T = SCQq \times R^{USD/SC}$

Example: To calculate the volume of source currency contributed to a transaction.

If the SCQq = 10 USD, and $R^{USD/GBP} = 0.62225$,

$SCQ^{TGBP} = 10 * 0.62225 = 6.2225$ GBP

Therefore, the client with SC=GBP would supply 6.2225 Pounds to this transaction and the client with BC=GBP would receive 6.2225 Pounds as a party to this transaction.

4. Consider the following example:

- Client B has 15 CAD as Source Currency Quantity (SCQ)and requires X JPY as Beneficiary Currency Quantity (BCQ)
- Client H has 3000 JPY as Source Currency Quantity (SCQ) and requires Y CAD as Beneficiary Currency Quantity (BCQ)

The prevailing foreign exchange rates are noted in the Table below:

Sample Transaction

Client	SCQ	FX Rate (see Table 7.1)	SCQ (in USD) Formula 1.0	BCQ	BC	Residual SCQ^R
B	15	1.45425	10.31	1128.93	JPY	0
H	3000	109.45	27.41	15.00	CAD	1871.068

SCQq = 10.31 USD

Therefore,

Applying the calculation

$$SCQ^{T} = SCQq \times R^{USD\ SC}$$

Client B:

$SCQ^{T\,CAD}$ = 10.31 X 1.45425 = 15 CAD (therefore "B" provides 15 CAD to "H")

$BCQ^{T\,JPY}$ = 1128.93 JPY

Client H:

$SCQ^{T\,JPY}$ = 10.31 X 109.45 = 1,128.93 JPY (therefore "H" provides 1,128.93 JPY to "B")

$BCQ^{T\,CAD}$ = 15 CAD

Client B, holding the smaller USD equivalent position, can be executed in its entirety; 1128.932 JPY for 15 CAD.

Client H receives 15 CAD and remains in the queue having available 1871.068 JPY for the next counterparty.

5. To calculate the residual source funds SCQ^{R} for the next applicable transaction, one need only subtract the SCQ^{T} (the quantity supplied to the transaction) from the original SCQ.

Formula 1.3:

$$SCQ^{R} = SCQ - SCQ^{T}$$

Example: To calculate the volume of source currency remaining after a transaction.

If the SCQ = 3000 JPY, and $SCQ^{T\,JPY}$ = 1128.93

$SCQ^{R\,JPY}$ = 3000 - 1128.93 = 1871.07 JPY

Therefore, the client with SC=JPY would be ready to supply at most, 1871.07 JPY to the next transaction.

6. A. All details of the transaction will be stored to a database for aggregation & "batch payment and settlement"

B. As currencies fluctuate against the USD, calculations will be generated from live data to supply the client with "real-time" competitive pricing.

7. Applying the BuyFX Algorithms and Procedures

7.1 Sample Foreign Exchange Rate Table

Mid Point FX Rates		
Currency	Quotation	Mid-Point
R USD/CAD	1.45375/475	1.45425
R USD/GBP	0.6220/25	0.62225
R USD/JPY	109.40/50	109.45
R USD/EUR	0.9860/65	0.98625
R USD/AUD	1.5830/40	1.5835
R USD/CHF	1.6270/75	1.62725
R USD/ZAR	6.3260/70	6.3265

Quotations as at 02/16/00

Note: Currency rates are dynamically reflected in the calculations in USD terms at any time T=match. The rates above are merely a static sampling for the purposes of this example.

7.2 Sample Currency Assignment Values

#	Currency	Values	Exponential
1	USD-AV	1	1.E+00
2	CAD-AV	10	1.E+01
3	GBP-AV	100	1.E+02
4	JPY-AV	1000	1.E+03
5	EUR-AV	10000	1.E+04
6	AUD-AV	100000	1.E+05
7	CHF-AV	1000000	1.E+06
8	ZAR-AV	10000000	1.E+07

7.3 Random Currency Entries using Tables 7.2

	SC	BC	SC-AV	BC-AV	SCQ
T=1.0	GBP	USD	100	1	20
T=1.1	CAD	JPY	10	1000	15
T=1.2	GBP	CAD	100	10	10
T=1.3	JPY	USD	1000	1	800
T=1.4	AUD	USD	100000	1	30
T=1.5	USD	EUR	1	10000	35
T=1.6	CAD	ZAR	10	10000000	15
T=1.7	JPY	CAD	1000	10	3000
T=1.8	EUR	GBP	10000	100	30
T=1.9	CAD	JPY	10	1000	40
T=2.0	EUR	CHF	10000	1000000	25
T=2.1	ZAR	GBP	10000000	100	110
T=2.2	CAD	AUD	10	100000	19.5
T=2.3	USD	GBP	1	100	30

Where SC/BC is Source/Beneficiary Currency; AV is Assignment Value; Q is Quantity

7.4 Sample Initial SCQs and AV Matches

Time	Client	SCAV	BCAV	AV-Match	Initial SCQ	Initial Q^{USD}
T=1.0	A	100	1	N/A	20	32.14
T=1.1	B	10	1000	N/A	15	10.31
T=1.2	C	100	10	N/A	10	16.07
T=1.3	D	1000	1	N/A	800	7.31
T=1.4	E	100000	1	N/A	30	18.95
T=1.5	F	1	10000	N/A	35	35.00
T=1.6	G	10	10000000	N/A	15	10.31
T=1.7	H	1000	10	1010	3000	27.41
T=1.8	I	10000	100	10101	30	30.42
T=1.9	J	10	1000	1010	40	27.51
T=2.0	K	10000	1000000	N/A	25	25.35
T=2.1	L	10000000	100	10000110	110	17.39
T=2.2	M	10	100000	N/A	19.5	13.41
T=2.3	N	1	100	101	30	30.00
T=2.3				100111		

The results of each subsequent client entry are recorded in 7.5 below.

5

7.5 Results of Sample Currency Entries

A

Time	Client	Initial Position	SCQ [R]	Description
T=1.7	B (T=1.1)	15.0 CAD	0 CAD	Client B receives 1128.93244 JPY
	H (T=1.7)	3000 JPY	1871.068 JPY	Client H receives 15.0 CAD

Client B requirement is executed in its entirety and Client B is removed from the queue.

Client H requirement is partially executed and Client H remains in the queue.

B

Time	Client	Initial Position	SCQ [R]	Description
T=1.8	I (T=1.8)	30 EUR	0 EUR	Client I receives 18.92776 GBP
	A (T=1.0)	20 GBP	1.07224 GBP	Client A receives 30.41825 USD
	F (T=1.5)	35 USD	4.58175 USD	Client F receives 30 EUR

Client I requirement is executed in its entirety and Client I is removed from the queue.

Client A requirement is partially executed and Client A remains in the queue.

Client F requirement is partially executed and Client F remains in the queue.

C

Time	Client	Initial Position	SCQ [R]	Description
T=1.9	H (T=1.7)	1871.068 JPY	0 JPY	Client H receives 24.86067 CAD
	J (T=1.9)	40 CAD	15.13933 CAD	Client J receives 1871.068 JPY

Client H requirement is executed in its entirety; Client H is removed from the queue.

Client J requirement is partially executed and Client J remains in the queue.

D

Time	Client	Initial Position	SCQ R	Description
T=2.1	G (T=1.6)	15 CAD	0 CAD	Client G receives 65.25529 ZAR
	L (T=2.1)	110 ZAR	44.74471 ZAR	Client L receives 6.41826 GBP
	C (T=1.3)	10 GBP	3.58174 GBP	Client C receives 15.0 CAD

Client G requirement is executed in its entirety and Client G is removed from the queue.

Client L requirement is partially executed and Client L remains in the queue.

Client C requirement is partially executed and Client C remains in the queue.

E

Using Transaction Aging Rules, Transaction E has priority over Transaction F.

Time	Client	Initial Position	SCQ R	Description
T=2.3	A (T=1.0)	1.07224 GBP	0 GBP	Client A receives 1.72317 USD
	N (T=2.3)	30 USD	28.27683 USD	Client N receives 1.07224 GBP

Client A requirement is executed in its entirety and Client A is removed from the queue.

Client N requirement is partially executed and Client N remains in the queue.

	Time	Client	Initial Position	SCQ [R]	Description
F	T=2.3	C (T=1.2)	3.58174 GBP	0 GBP	Client C receives 8.37083 CAD
		M (T=2.2)	19.5 CAD	11.12917 CAD	Client M receives 9.11481 AUD
		E (T=1.4)	30 AUD	20.88519 AUD	Client E receives 5.75612 USD
		N (T=2.3)	28.27683 USD	22.52071 USD	Client N receives 3.58174 GBP

Client C requirement is executed in its entirety and Client C is removed from the queue.

Client M requirement is partially executed and Client M remains in the queue.

Client E requirement is partially executed and Client E remains in the queue.

Client N requirement is partially executed and Client N remains in the queue.

8. Sample Client Positions (after 14 observations)

Client	SCQ	SC	BC	Net BCQ (A)	SCQ R USD	%B/A
A	20	GBP	USD	32.14	0.00	0.00%
B	15	CAD	JPY	1128.93	0.00	0.00%
C	10	GBP	CAD	23.37	0.00	0.00%
D	800	JPY	USD	0.00	7.31	100.00%
E	30	AUD	USD	5.76	13.19	69.62%
F	35	USD	EUR	30.00	4.52	13.09%
G	15	CAD	ZAR	65.26	0.00	0.00%
H	3000	JPY	CAD	39.86	0.00	0.00%
I	30	EUR	GBP	18.93	0.00	0.00%
J	40	CAD	JPY	1871.07	1139.42	37.85%
K	25	EUR	CHF	0.00	41.25	100.00%
L	110	ZAR	GBP	6.42	4.40	40.68%
M	19.5	CAD	AUD	9.11	12.12	57.07%
N	30	USD	GBP	4.65	14.01	75.07%

Note: %B/A is the percentage of currency which is, as yet, unfilled after 14 observations.

9. Summary of Results

Client	Initial Req't (in USD)	Value Executed (in USD)	% Executed
A	32.14	32.14	100%
B	10.31	10.31	100%
C	16.07	16.07	100%
D	7.31	0.00	0%
E	18.95	5.76	30%
F	35.00	30.42	87%
G	10.31	10.31	100%
H	27.41	27.41	100%
I	30.42	30.42	100%
J	27.51	17.10	62%
K	25.35	0.00	0%
L	17.39	10.31	59%
M	13.41	5.76	43%
N	30.00	7.48	25%
Totals	301.57	203.49	67%

10. Observations from Table 8.0

A	Percentage of Transactions executed fully	43%
B	Percentage of Transactions executed partially	43%
C	Percentage of Remaining Transactions	14%
D	Initial USD equivalent value in queue	301.57
E	Value of USD equivalent Matched	203.49
F	Percentage of Value Matched	67%

11. Glossary of Terms

SC **Source Currency** - the available currency i.e. the currency to be converted

BC **Beneficiary Currency** - the desired or destination currency i.e. the currency into which the source funds will be converted

AV **Assignment Value** - an identifier used to distinguish one currency from another

eg. GBPAV= 1.E+02; AVs are used to source matches between clients (see Searching Algorithm).Currency pairs or multiples have unique AV totals (see Table 7.2); for example, a pairing of CAD & GBP is identified by 110; GBP & USD by 101; CAD & JPY by 1010 etc.

SCAV **Source Currency Assignment Value** - the value assigned to the source currency of a client transaction e.g. if client has GBP for conversion to CAD, SC = GBP, therefore SCAV =GBPAV= 1.E+02 (see Table 7.2)

BCAV **Beneficiary Currency Assignment Value** - the value assigned to the beneficiary currency of a client transaction e.g. if client has GBP for conversion to CAD, BC = CAD, therefore BCAV =CADAV= 1.E+01 (see Table 7.2).

AV Match **Assignment Value Match** - by definition, a match occurs when the Source Currency AV of two or more parties is equal to the Beneficiary Currency AV of those same parties; SCAV=BCAV or SCAV-BCAV=0 eg. If one client has GBP to convert to CAD and another client has CAD to convert to GBP,

SCAV = GBPAV ÷ CADAV = 110 = BCAV = GBPAV ÷ CADAV

SCQ **Source Currency Quantity** - the amount of source currency to be converted

BCQ **Beneficiary Currency Quantity** - the amount of beneficiary currency available post-transaction(s)

Q^{USD} Represents a Source Currency in USD equivalent terms; used to compare the SCQs of the participants in a transaction to discover the SCQq (see below)

R **Foreign Exchange Rate** - the amount of one currency required to procure another

eg. If 109.45 JPY = 1 USD; R = USD/JPY = 109.45

SCQq Represents the limiting factor to a transaction, the SCQq is the smallest SCQ (or SCQ^R), as denoted in USD terms, from the participants to a transaction.

SCQ^T Represents the quantity of currency contributed by a client in executing a transaction.

$SCQ^T = SCQq \times R^{USD/SC}$

SCQ^R Represents the residual currency post-transaction available in the queue for future matches.

$SCQ^R = SCQ - SCQ^T$

Queue All of the SCQ'S available for transactions, prioritized by system transaction rules and user-defined parameters.

Claims

1. A method of multi-currency funds settlement comprising the following steps:

funds in a currency X of a first legal person who is situated in country X^1 are transferred in whole or part within country X^1 to satisfy in whole or part the currency X^1 payment obligations of a second legal person, situated in a different country Y^1;

and the funds in a currency Y of that second legal person situated in country Y^1 are transferred in whole or part within country Y^1 to satisfy in whole or part the currency Y payment obligations of a legal person, who may be the first legal person or one or more different or additional legal persons.

2. The method of multi-currency funds settlement as defined in Claim 1 in which each legal person seeking to transfer foreign currency enters into a computer program an amount of foreign currency required and an applicable payee.

3. The method of Claim 2 in which the computer program is hosted on one or more web servers.

4. The method of any preceding claim in which funds which are transferred to a payee in a given jurisdiction are generated from a series of debits and credits passing back to a debit of cleared funds of a bank account held by a legal person in that same jurisdiction, that legal person not seeking to transfer funds to that payee but to a payee in a different jurisdiction.

5. A computer program receiving data defining the non-domestic payment obligations of parties located in two or more countries, and programmed to identify

opportunities to satisfy those non-domestic payment obligations by assigning payment obligations using the funds settlement method defined in Claim 1 - 4.

6. A computer server programmed with the computer program of Claim 5.

7. A computer terminal acting as a client, in which the client accepts from a party a foreign exchange requirement and sends that requirement to a server as defined in Claim 6.

8. A computer based system which enables parties located in two or more jurisdictions to meet their foreign currency payment obligations, comprising a first computer terminal into which a party located in a first jurisdiction inputs details of a potential first foreign currency financial transaction, a second computer terminal into which a second party located in a second jurisdiction inputs details of a potential second financial transaction, a computer network connecting the first and second terminals; characterised in there being a computer program arranged to determine if any transfer of funds from the first party to a payee located in the first jurisdiction satisfies in whole or part the requirement of the second party to transfer funds to that payee.

9. The computer based system of Claim 8 in which there are numerous computer terminals in numerous countries and the computer program is arranged to determine if any transfer of funds from a party to a payee located in the jurisdiction of that party satisfies in whole or part the requirement of another party to transfer funds to that payee.

Figure 1

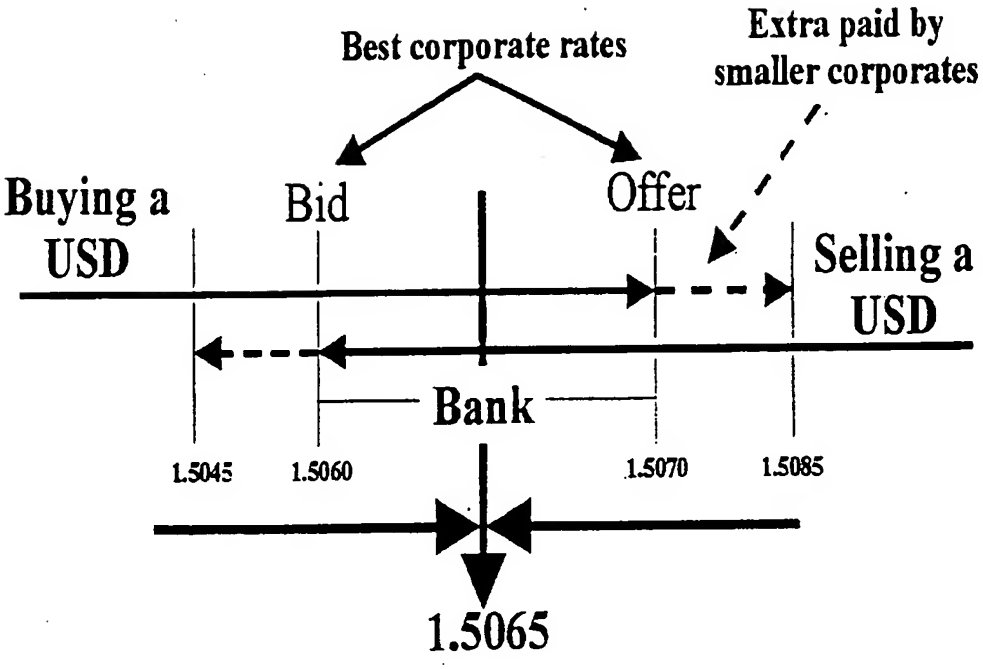

Best corporate rates
Extra paid by smaller corporates
Buying a USD
Bid
Offer
Selling a USD
Bank
1.5045
1.5060
1.5070
1.5085
1.5065

Figure 2a: PRE-MATCH

Available	10	CAD				
Desired	577.6834	JPY				
Available			4438.77	JPY		
Desired			50	USD		
Available					25	USD
Desired					38.4187	CAD

Figure 2b: POST MATCH

	A		B		C	
Available	0	CAD				
Desired	0	JPY				
Matched	577.6834	JPY				
Available			3861.09	JPY		
Desired			43.4927	USD		
Matched			6.5073	USD		
Available					18.4927	USD
Desired					28.4187	CAD
Matched					10	CAD

Figure 2C

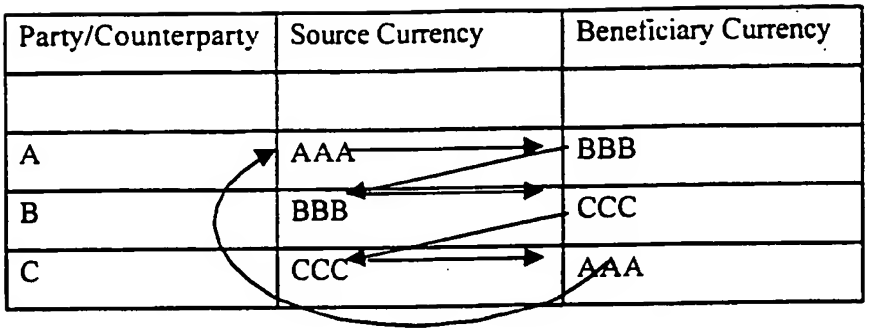

Party/Counterparty
Source Currency
Beneficiary Currency
A
AAA
BBB
B
BBB
CCC
C
CCC
AAA

Figure 3A

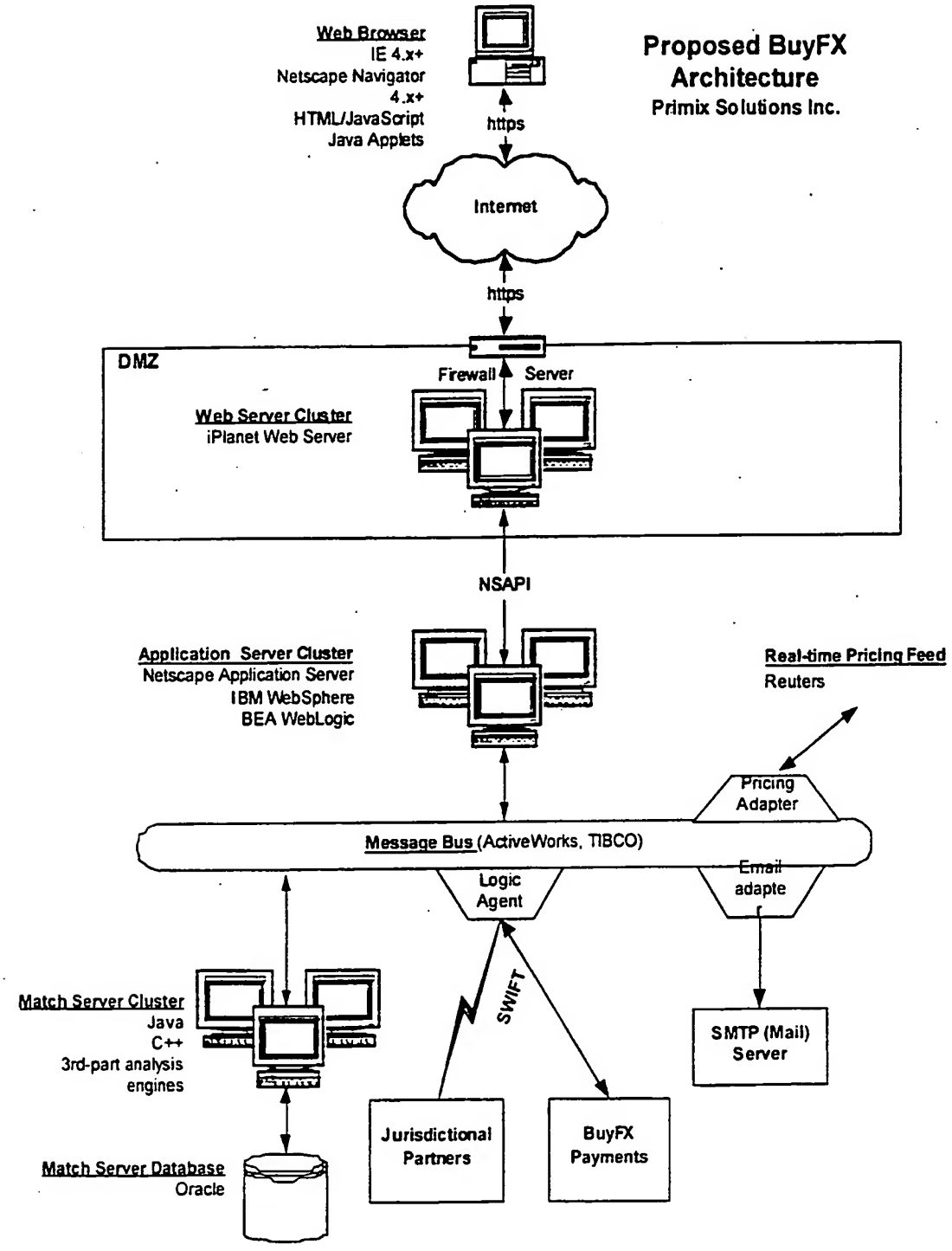
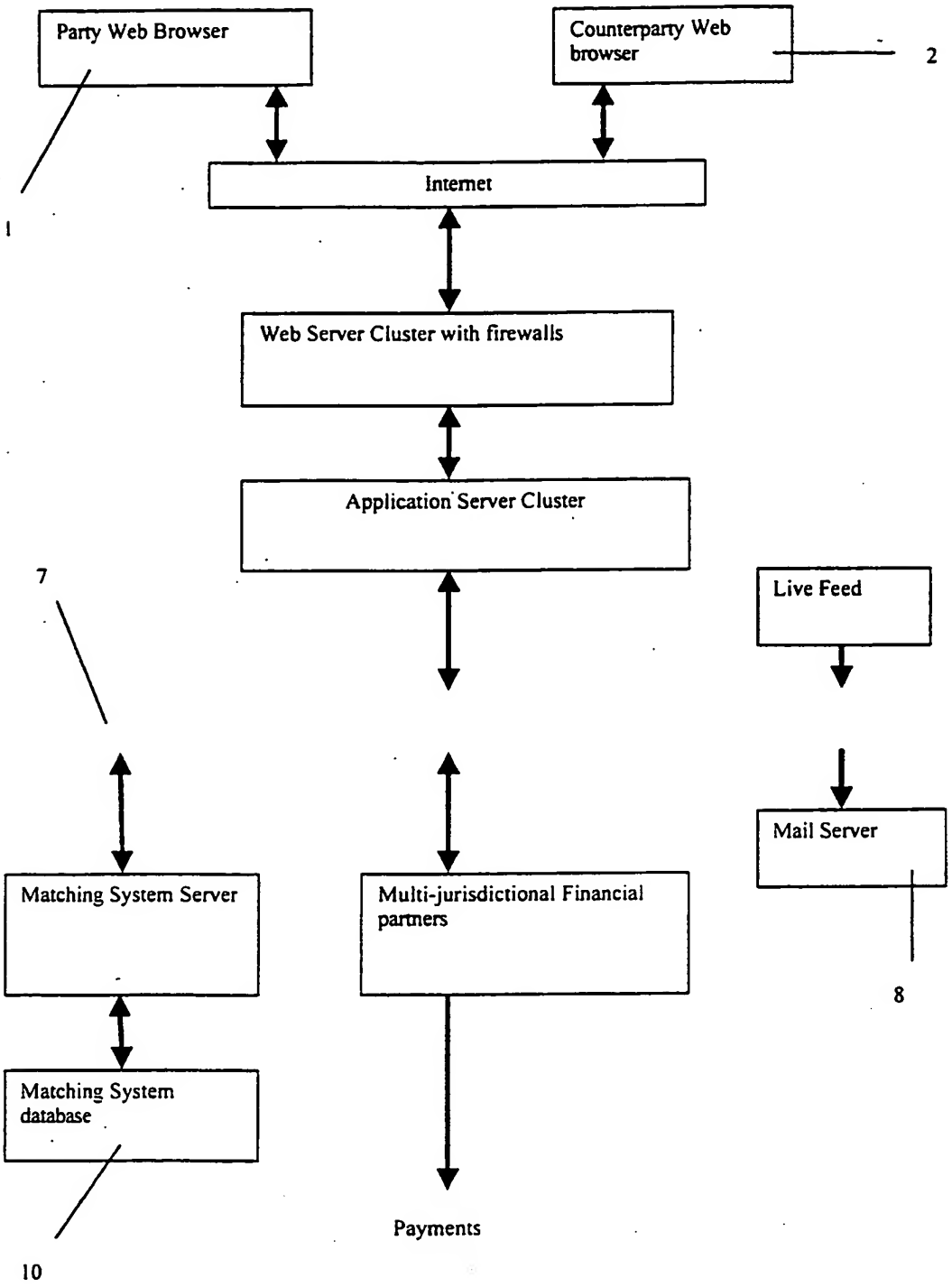

Web Browser
IE 4.x+
Netscape Navigator 4.x+
HTML/JavaScript
Java Applets
https
Internet
https
DMZ
Firewall
Server
Web Server Cluster
iPlanet Web Server
NSAPI
Application Server Cluster
Netscape Application Server
IBM WebSphere
BEA WebLogic
Real-time Pricing Feed
Reuters
Pricing Adapter
Message Bus (ActiveWorks, TIBCO)
Logic Agent
Email adapter
SWIFT
Match Server Cluster
Java
C++
3rd-part analysis engines
SMTP (Mail) Server
Jurisdictional Partners
BuyFX Payments
Match Server Database
Oracle
Proposed BuyFX Architecture
Primix Solutions Inc.

Figure 3B


Party Web Browser
Counterparty Web browser
2
Internet
1
Web Server Cluster with firewalls
Application Server Cluster
7
Live Feed
Mail Server
8
Matching System Server
Multi-jurisdictional Financial partners
Matching System database
10
Payments

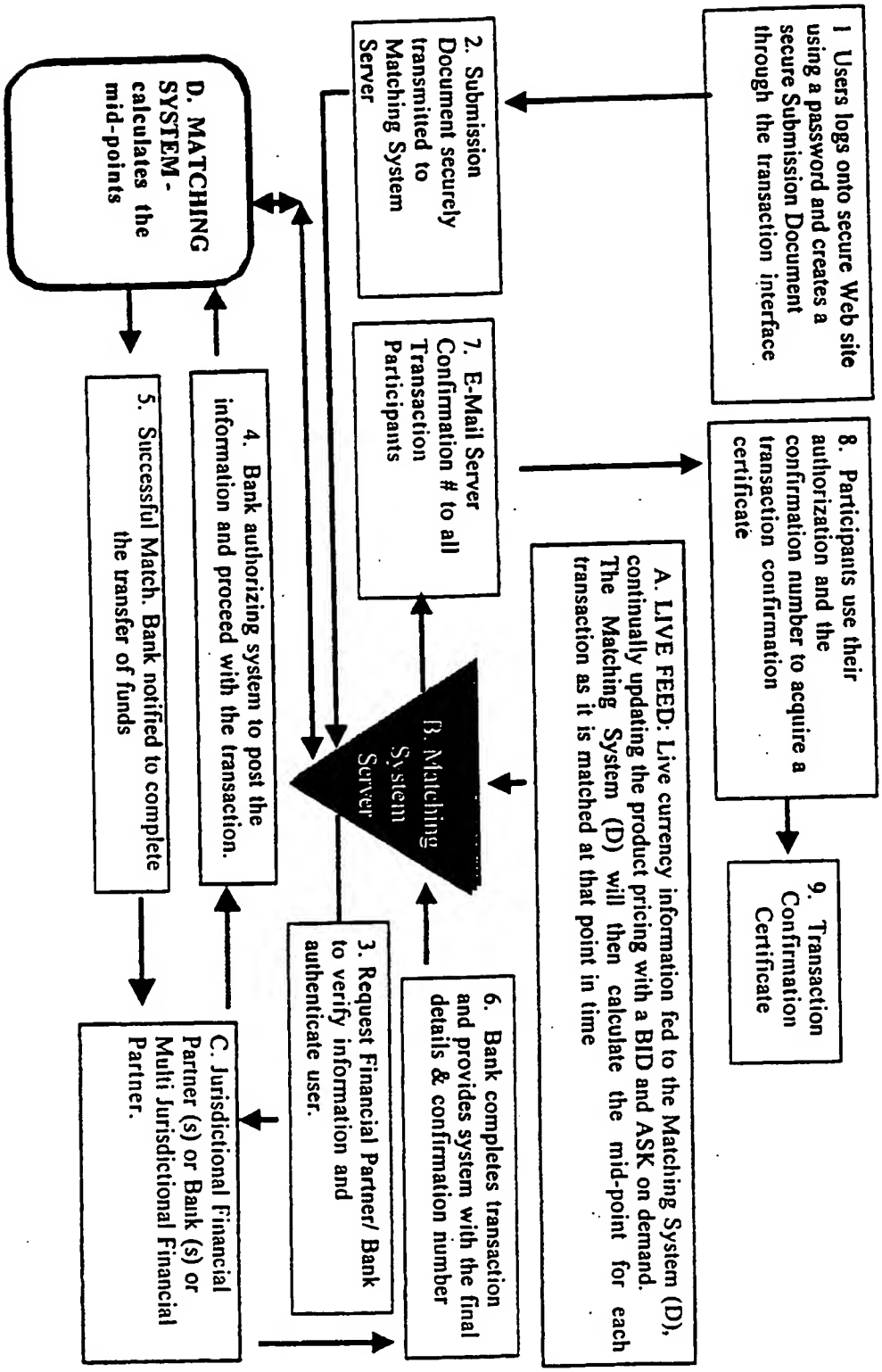

1 Users logs onto secure Web site using a password and creates a secure Submission Document through the transaction interface
2. Submission Document securely transmitted to Matching System Server
8. Participants use their authorization and the confirmation number to acquire a transaction confirmation certificate
9. Transaction Confirmation Certificate
A. LIVE FEED: Live currency information fed to the Matching System (D), continually updating the product pricing with a BID and ASK on demand. The Matching System (D) will then calculate the mid-point for each transaction as it is matched at that point in time
B. Matching System Server
7. E-Mail Server Confirmation # to all Transaction Participants
6. Bank completes transaction and provides system with the final details & confirmation number
3. Request Financial Partner/ Bank to verify information and authenticate user.
C. Jurisdictional Financial Partner (s) or Bank (s) or Multi Jurisdictional Financial Partner.
4. Bank authorizing system to post the information and proceed with the transaction.
5. Successful Match. Bank notified to complete the transfer of funds
D. MATCHING SYSTEM - calculates the mid-points

Figure 4

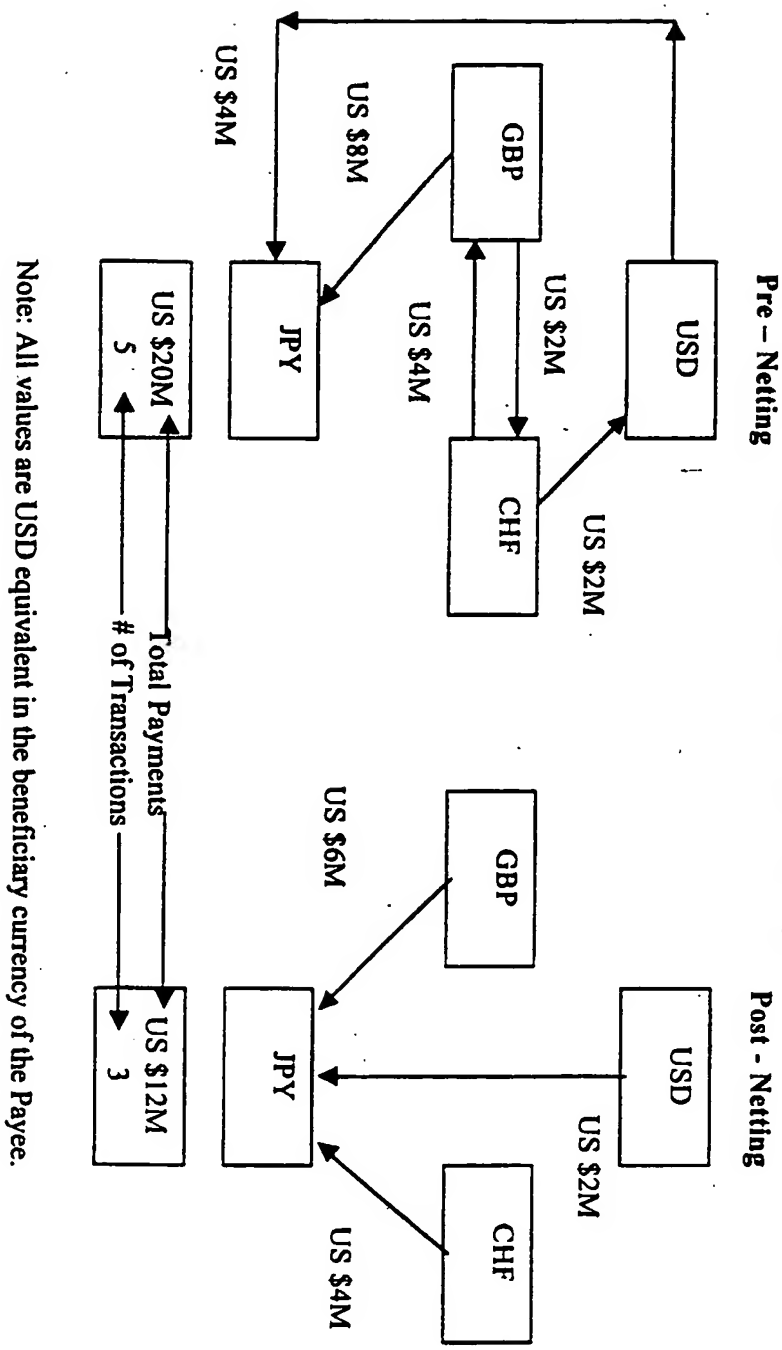


Figure 5 The Mechanics of Netting

Note: All values are USD equivalent in the beneficiary currency of the Payee.

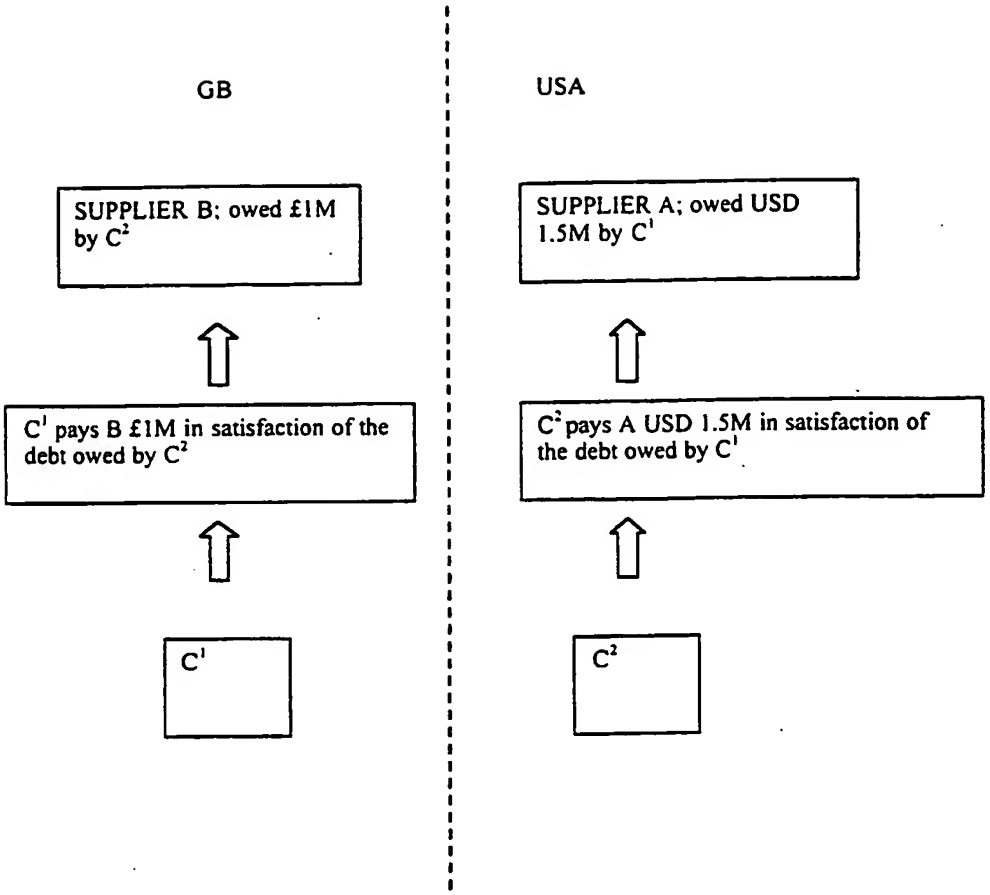

GB
USA
SUPPLIER B: owed £1M by C2
SUPPLIER A; owed USD 1.5M by C1
C1 pays B £1M in satisfaction of the debt owed by C2
C2 pays A USD 1.5M in satisfaction of the debt owed by C1
C1
C2

Figure 6

Corporation	Domestic Financial Institution	BuyFX.com Correspondent Bank	Foreign Financial Institution	Domestic Currency	Required Currency
C^1	FI^{C1}	FI^{BFX1}	FI^{FC1}	GBP	USD
C^2	FI^{C2}	FI^{BFX2}	FI^{FC2}	USD	YEN
C^3	FI^{C3}	FI^{BFX3}	FI^{FC3}	YEN	GBP

Figure 7

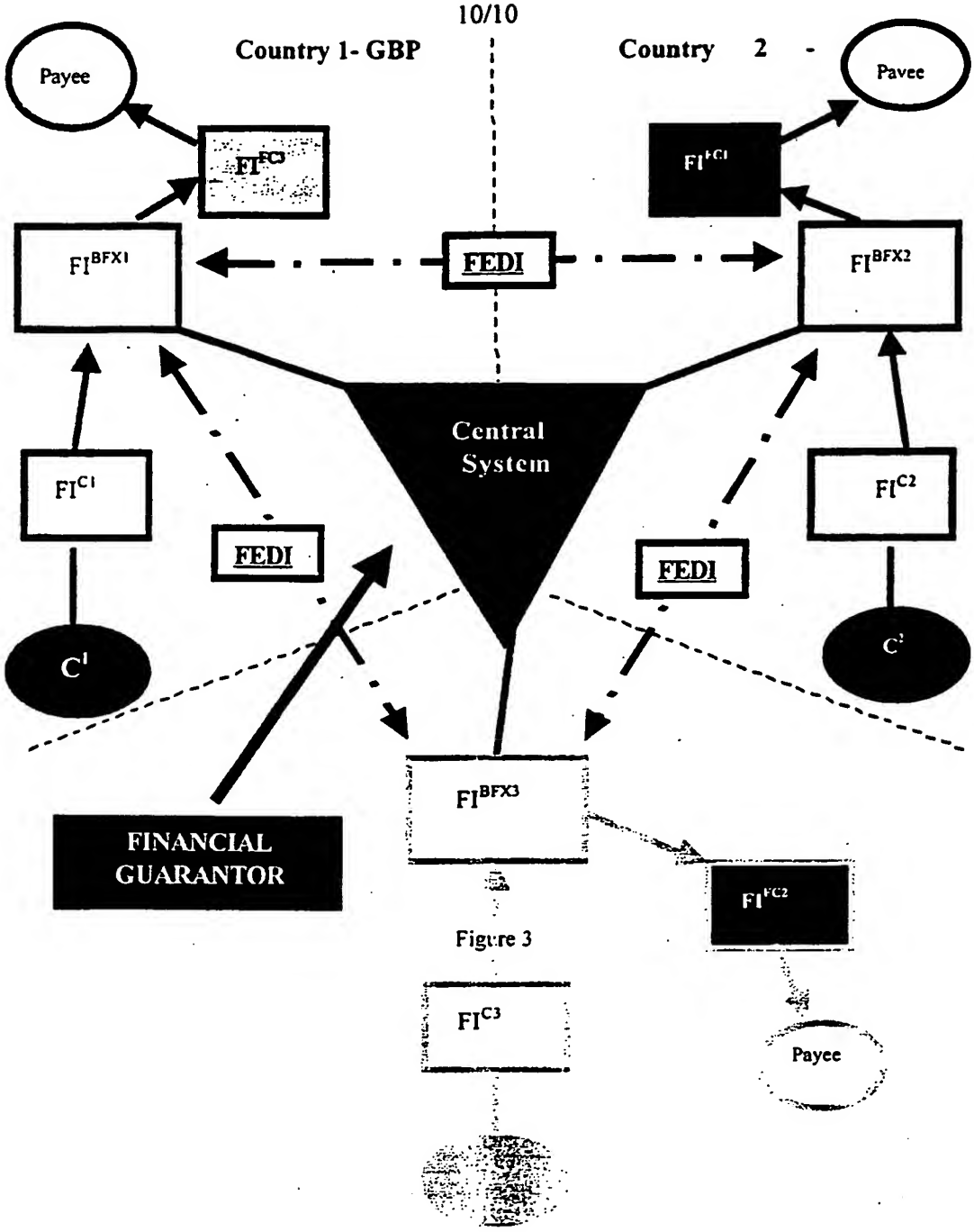


Figure 3

Figure 8